

REMARKS/ARGUMENTS

Reconsideration of this application in light of the foregoing amendments and following comments is courteously solicited.

Applicants submit herewith new Figures 14a and 14b for approval by the examiner. Reference numeral 119 in Figures 14a and 14b has been corrected to read "109". Accordingly, it is submitted that the amendments to Figures 14a and 14b overcome the examiner's drawing objections.

With regard to the examiner's objection to the Abstract, the Abstract has been amended so as to overcome the aforesaid objection.

With regard to the rejection of previously submitted claims 1 and 2 under 35 U.S.C. 112, first paragraph, Applicants traverse the examiner's rejection. Applicants believe that the subject matter which the examiner objects to as new matter is implicit in the instant specification particularly from the description set forth in paragraphs [0076] and [0077] taken in conjunction with Figure 8. In light of the foregoing, the examiner is respectfully requested to reconsider the position set forth in paragraph 7 of his office action. It is noted that claim 1 has been amended by the instant amendment and it is believed that the objection raised in paragraph 7 of the

examiner's final rejection is no longer appropriate in light of the amendment and the foregoing comments.

Independent claims 1, 3 and 19 have been amended in the instant amendment so as to set forth with more specificity the essential features of the present invention as set forth, in particular, [0076] and [0077] of the instant application. In accordance with the present invention, carriers (electrons) in the quantum dots are excited by absorbing photons of incident light, released from the quantum dots, and accumulated in channel. By the quantum dots releasing the carriers, the electric potential of the region around the quantum dots changes, that is to say, electric states of the quantum dots turns to be not neural (positive when the carriers are electrons). The quantum dots in high potential states in comparison with other region, particularly in comparison with a contact layer, draw carriers (electrons) from the contact layer (it is stated, in the specification, the quantum dots influence the potential of the channel so that the channel draw many carriers from source Ohmic contact). These carriers are entirely distinct from the carriers released from the quantum dots. The carriers drawn from the contact layer are additionally accumulated in the channel. The carriers in the contact layer are accumulated until the quantum dots are

refilled with as many other carriers (electrons) as the carriers released from the quantum dots by reason of absorbing incident lights so that the quantum dots turn to be in electrically neutral state. The carriers (electrons) refilled in the quantum dots originate from the current, which flows through quantum dot layer by an electric field applied to the electrodes. In the present invention the probability of the carriers refilling the quantum dots is not so high because many quantum dots formed in the quantum dot layer act as barriers to current flow. The two respective electrodes are formed at respective end portions of the quantum dot layer and the electron-flow through the quantum dot layer is, accordingly, blocked by many quantum dots formed in the quantum dot layer.

In the invention of Esaki et al., the respective cladding electrodes are formed respectively at above and under portions of the quantum structures (quantum wells) and the quantum structures are rapidly refilled with electrons provided by the electrodes because the quantum structure layer is very thin and the electrons are practically obstructed by nothing.

Finally it should be noted that the number of carriers accumulated in the channel is larger than that of carriers excited and released from the quantum dots by reason of incident light, and accordingly, the photo detect device of the present

invention can detect extremely small quantity of incident light by virtue of additionally drawn carriers.

In light of the foregoing, it is submitted that claims 1, 3 and 19 as amended patentably define over the cited and applied prior art and an early indication of same is respectfully requested.

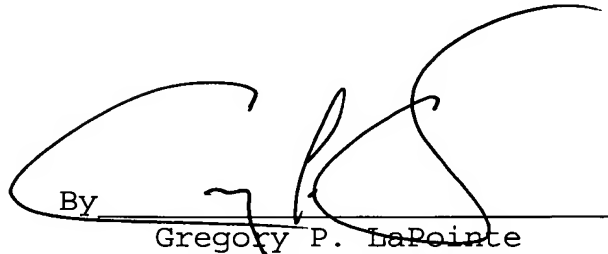
An earnest and thorough attempt has been made by the undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

It is submitted that the claims as amended herein patentably define over the art relied on by the Examiner and early allowance of same is courteously solicited.

If any fees are required in connection with this case, it
is respectfully requested that they be charged to Deposit
Account No. 02-0184.

Respectfully submitted,

Taehee Cho et al.

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Date: February 25, 2005

I hereby certify that this correspondence is being deposited with the United States Postal
Service with sufficient postage as first class mail in an envelope addressed to: "Commissioner
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Rachel Piscitelli

ANNOTATED SHEET

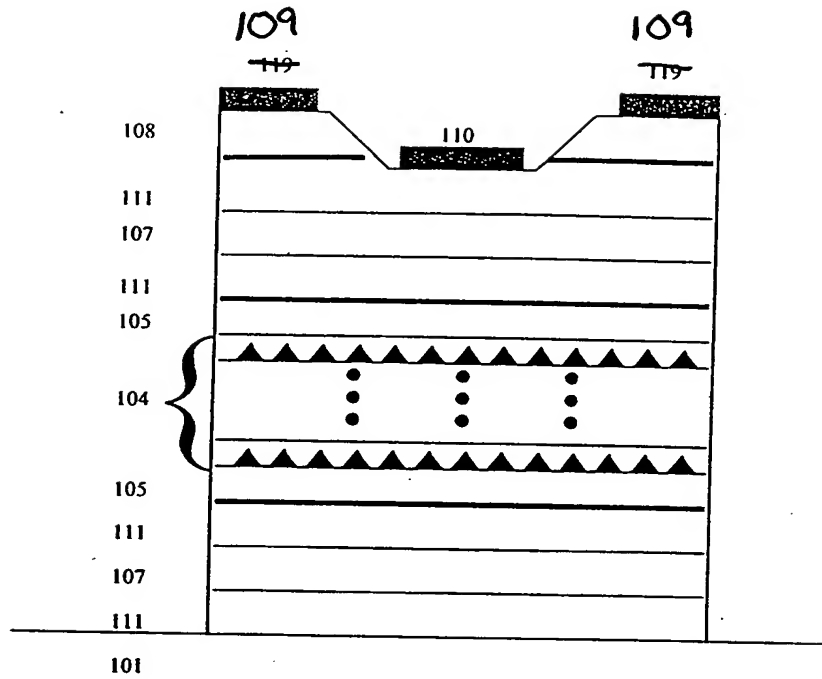


Fig. 14a

ANNOTATED SHEET

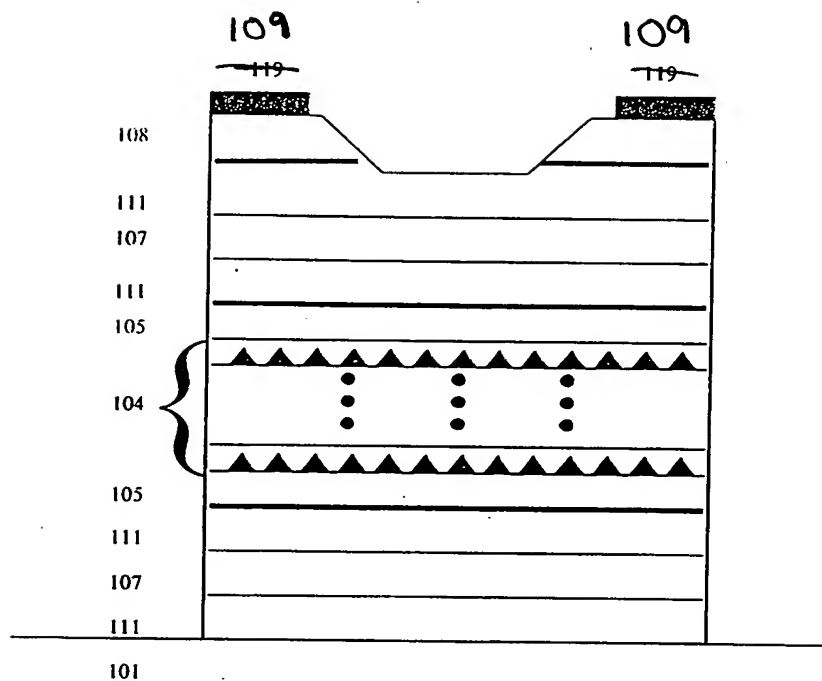


Fig. 14b